

CLAIMS

- Sub A1*
1. A stiffener to provide stiffening support to one of a thin-core and coreless substrate of an integrated circuit printed circuit board (IC-PCB) carrier package.
2. A stiffener as claimed in claim 1, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.
3. A stiffener as claimed in claim 1, the stiffener is substantially made of at least one of a metal-like, plastic-like, glass-like and ceramic-like material, is one of a molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.
4. A stiffener as claimed in claim 1, the stiffener being planar for mounting to a die-side major planar surface of the substrate.
5. A stiffener as claimed in claim 1, the stiffener having an internal window therein to provide clearance for at least one of a die, under-fill, die side components (DSC), and integrated heat spreader (IHS).
6. A stiffener as claimed in claim 1, the stiffener being a multi-part stiffener.

- al  
Cont*
7. A stiffener as claimed in claim 1, the stiffener having an above-substrate-plane height when mounted, which is less-than or equal to an above-substrate-plane height, when mounted, of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
  8. A stiffener as claimed in claim 1, the stiffener having a top surface above a substrate-plane when mounted, which is substantially co-planar with, when mounted, a top surface of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader.
  9. A stiffener as claimed in claim 8, the stiffener being adapted to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
  10. A stiffener as claimed in claim 1, where if a main body of the stiffener is electrically conductive, the stiffener further includes an insulator to electrically insulate electrical members on stiffener-opposing areas of the substrate.
  11. A stiffener as claimed in claim 1, the stiffener being an edge stiffener for mounting to minor-planar side-surfaces of the substrate.
  12. A stiffener as claimed in claim 1, the edge stiffener having a non-flat cross section which is adapted to mate with the side-surfaces of the substrate.

- A1  
Cont*
13. A stiffener as claimed in claim 1, where the edge stiffener is adapted to be pre-attached to the substrate by an IC-PCB carrier package manufacturer.
14. A thin-core or coreless integrated circuit printed circuit board (IC-PCB) carrier package comprising: a stiffener to provide stiffening support to one of a thin-core and coreless substrate of the IC-PCB carrier package.
15. An IC-PCB carrier package as claimed in claim 14, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.
16. An IC-PCB carrier package as claimed in claim 14, where the stiffener is substantially made of at least one of a metal-like, plastic-like, glass-like and ceramic-like material, is one of a molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.
17. An IC-PCB carrier package as claimed in claim 14, the stiffener being planar and mounted to a die-side major planar surface of the substrate.
18. An IC-PCB carrier package as claimed in claim 14, the stiffener having an internal window therein to provide clearance for at least one of a die, under-fill, die side components (DSC), and integrated heat spreader (IHS).

- a  
Cont*
19. An IC-PCB carrier package as claimed in claim 14, the stiffener being a multi-part stiffener.
20. An IC-PCB carrier package as claimed in claim 14, the stiffener having an above-substrate-plane height, which is less-than or equal to an above-substrate-plane height, when mounted, of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
21. An IC-PCB carrier package as claimed in claim 14, the stiffener having a top surface above a substrate-plane, which is substantially co-planar with, when mounted, a top surface of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader.
22. An IC-PCB carrier package as claimed in claim 21, the stiffener being adapted to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
23. An IC-PCB carrier package as claimed in claim 14, where if a main body of the stiffener is electrically conductive, the stiffener further includes an insulator to electrically insulate electrical members on stiffener-opposing areas of the substrate.
24. An IC-PCB carrier package as claimed in claim 14, the stiffener being an edge stiffener mounted to minor-planar side-surfaces of the substrate.

- a/*  
*cont.*
25. An IC-PCB carrier package as claimed in claim 14, the edge stiffener having a non-flat cross section which is mated with the side-surfaces of the substrate.
26. An IC-PCB carrier package as claimed in claim 14, where the edge stiffener is pre-attached to the substrate by an IC-PCB carrier package manufacturer.
27. A packaged integrated circuit (IC) comprising:  
a thin-core or coreless integrated circuit printed circuit board (IC-PCB) carrier package comprising a stiffener to provide stiffening support to one of a thin-core and coreless substrate of the IC-PCB carrier package.
28. A packaged IC as claimed in claim 27, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.
29. A packaged IC as claimed in claim 27, where the stiffener is substantially made of at least one of a metal-like, plastic-like, glass-like and ceramic-like material, is one of a molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.
30. A packaged IC as claimed in claim 27, the stiffener being planar and mounted to a die-side major planar surface of the substrate.

- as  
can*
31. A packaged IC as claimed in claim 27, the stiffener having an internal window therein to provide clearance for at least one of a die, under-fill, die side components (DSC), and integrated heat spreader (IHS).
32. A packaged IC as claimed in claim 27, the stiffener being a multi-part stiffener.
33. A packaged IC as claimed in claim 27, the stiffener having an above-substrate-plane height, which is less-than or equal to an above-substrate-plane height, when mounted, of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
34. A packaged IC as claimed in claim 27, the stiffener having a top surface above a substrate-plane, which is substantially co-planar with, when mounted, a top surface of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader.
35. A packaged IC as claimed in claim 34, the stiffener being adapted to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).
36. A packaged IC as claimed in claim 27, where if a main body of the stiffener is electrically conductive, the stiffener further includes an insulator to electrically insulate electrical members on stiffener-opposing areas of the substrate.

37. A packaged IC as claimed in claim 27, the stiffener being an edge stiffener mounted to minor-planar side-surfaces of the substrate.

38. A packaged IC as claimed in claim 27, the edge stiffener having a non-flat cross section which is mated with the side-surfaces of the substrate.

39. A packaged IC as claimed in claim 27, where the edge stiffener is pre-attached to the substrate by an IC-PCB carrier package manufacturer.

Add 1  
Add 2  
Add 5  
B